Trust and Objects: Trust Building Capacities of Objects in Interorganizational Collaboration

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Abstract

Research has focused on the individual dispositions of trust and the interpersonal trust relations among boundary spanners, paying little attention to the role objects play in trust building in inter-organizational collaboration processes. This work explores the dynamic relation between trust and digital objects in inter-organizational collaboration. A longitudinal study of an innovative tele-home monitoring service involving health professionals from hospitals, municipalities, and general practice clinics forms the empirical context.

This study demonstrates that trust is not exclusively a human feature but also a dimension of digital objects since such objects mediate and build trust among actors by enabling *focused communication and shared knowledge*, improving *predictability and transparency in behavior and decision making*, and creating *visibility of work contexts and tasks*. In this paper, these three features denote objects' *trust-building capacities*, which support shared problem-solving and collaboration. The study, however, also shows a flip side, since digital objects may cause mistrust and thereby act as barriers to collaboration. Overall, these insights contribute to the literature about trust in inter-organizational collaboration processes by foregrounding the role of objects in trust-building processes and exploring their trust-building capacities.

Practical Relevance

➢ Digital objects play a significant role in inter-organizational collaboration processes.

➢ Trust is not exclusively a human feature, since objects also have trust-building capacities.

➢ Decision makers and IT system designers must be aware of digital objects' impact on trust building and collaboration processes and design IT systems and work processes accordingly.

➢ Digitally mediated collaboration must be supported by boundary-spanning activities and human interaction to avoid undesirable collaboration dynamics.

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Introduction

Public services often rely on collaboration across knowledge domains and organizational boundaries. Therefore, there is a growing focus on boundary-spanning activities and roles in the public sector (Williams, 2012). Several studies have shown that trust plays a vital role in supporting inter-organizational collaboration and boundary-spanning activities, as it reduces conflicts; facilitates negotiations; and enhances performance, innovation, and learning (Paul & McDaniel, 2004; Swärd, 2016; Vangen & Huxham, 2003; Zaheer, McEvily, & Perrone, 1998). In the digital-era government (Dunleavy et al., 2006), digitalization of welfare services, work processes, and communication has become

increasingly widespread. As a result, communication and collaboration across boundaries and organizations is often digitally mediated (Newell, David, & Chand, 2007). Accordingly, digitally mediated collaboration is imperative to understanding inter-organizational collaboration processes in a contemporary Nordic public sector context. Digitalization is not limited to intra-organizational processes but highly affects cross-sectorial and inter-organizational relations and collaboration processes.

This study explores the dynamic relation between trust and digital objects in inter-organizational collaboration in public health care services. Previous research has demonstrated the dynamics, divergence, and contingencies of trust in collaboration processes (Brattström et al., 2019; Kroeger & Bachmann, 2014; Schilke & Cook, 2013; Swärd, 2016; Vangen & Huxham, 2003). However, organizational scholars have paid little attention to objects or other material matters in relation to trust building and maintenance. Instead, individual dispositions of trust or the interpersonal trust relations among boundary spanners have been foregrounded (Newell & Swan, 2000; Schilke & Cook, 2013; and Sloan & Oliver, 2013), with only a few studies focusing on inter-organizational trust or institutional-based trust (Bachmann, 2011) As a result, we have limited knowledge about the role of materiality and objects in relation to trust, which is a critical shortcoming, since several scholars have demonstrated how objects play important roles in collaboration processes (Engeström & Blackler, 2005; McGivern & Dopson, 2010; Nicolini, Mengis, & Swan, 2012; Scarbrough, Panourgias, & Nandhakumar, 2014). The literature about boundary objects has demonstrated the mediating and facilitating role these objects play when collaboration involves actors from divergent knowledge domains (Barrett & Oborn, 2010; Carlile, 2002; Dodgson, Gann, & Salter, 2007; Star & Griesemer, 1989).

While trust is portrayed as resource demanding and time consuming to establish and maintain (Bachmann, 2011; Vangen & Huxham, 2003), boundary objects are often shown to have some of the same positive effects on collaboration processes, without the same demand for resources (Carlile, 2002; Dodgson et al., 2007). Accordingly, objects may support trust or, in some situations, be functionally equivalent to trust in inter-organizational collaboration processes. This may be the case in situations with temporary and fast-changing collaboration relations, where interpersonal trust can be difficult to maintain. However, the two streams of literature about trust and objects have remained separate. This study explores the role of objects in trust building and maintenance in inter-organizational collaboration processes. The paper is organized around the research question: *What is the relation between trust and digital objects, and what are the trust-building capacities of digital objects in inter-organizational collaboration processes?*

The empirical base consists of a longitudinal qualitative case study of an inter-organizational tele-home monitoring health service in Denmark for patients with chronic obstructive pulmonary disease (COPD). As a part of this service, a digital monitoring database was developed, which served as a joint database for health professionals from hospitals, municipalities, and general practitioner clinics in northern Denmark. The database contained COPD patients' self-measurements of their vital signs (e.g., oxygen saturation, blood pressure, and pulse), and it was intended as a tool for inter-organizational collaboration. This study demonstrates that trust is not only a human feature among boundary spanners but also a dimension of digital objects used in inter-organizational collaboration processes. Concretely, this study suggests that objects play an important role in trust building and maintenance in inter-organizational collaboration processes. Digital objects mediate trust by enabling *communication and shared knowledge*, improving *predictability and transparency in behavior and decision making*, and creating *visibility of work contexts and responsibilities*. In the context of this paper, these three features denote the digital object's *trust-building capacities*, which support shared problem solving and collaboration. The results, however, also show a flip side, where digital objects may cause mistrust and thereby act as barriers to collaboration. Overall, these insights contribute to the literature about trust in inter-organizational collaboration processes by foregrounding the role of digital objects in trust-building processes and exploring their trust-building capacities. Moreover, the paper contributes rich empirical examples of technologically mediated collaboration in an inter-organizational context.

Theoretical Framework

Trust in inter-organizational collaboration

Boundary spanning in inter-organizational collaboration contexts is portrayed as challenging, due to actors' divergent practices, goals, and interests, along with their competing concerns, in some cases (Dodgson et al., 2007). It is often characterized by the absence of a shared authority that holds the power to determine solutions or resolve conflicts; instead, boundary spanners must negotiate shared solutions (Swan & Scarbrough, 2005; Williams, 2012). Trust is therefore essential in inter-organizational collaboration and boundary spanning.

Trust has two basic components. The first concerns expectations about the predictability of collaborating actors' behavior and their reliability in fulfilling obligations (Lane & Bachmann, 1998; Vangen & Huxham, 2003). Hence, trust safeguards against uncertainty and risk. At the same time, trusting someone involves accepting the risk that the other party will fail to meet expectations. Therefore, trust and risk are reciprocal (Vangen & Huxham, 2003). The second component relates to expectations about fairness and goodwill from the collaborating actor. This involves the expectation that no one acts opportunistic and takes advantage of the situation by exploiting the trustor's vulnerability (Lane & Bachmann, 1998; Vangen & Huxham, 2003). This component adds a moral foundation to the concept of trust and implies that collaborators behave according to common interests (Paul & McDaniel, 2004).

Various studies have shown several advantages of trust in inter-organizational relations, such as efficient collaboration, better performance, stable relations, stimulated knowledge exchange and mutual learning, and increased innovation capacity (Newell & Swan, 2000; Swärd, 2016; Vangen & Huxham, 2003; Zaheer et al., 1998). Particularly, in situations where tasks are interdependent and involve highly important issues, e.g., in health care work, vulnerability and the need for trust are higher (Newell & Swan, 2000). Diagnosis and decision making often rely on the delegation of work to other health professionals (or technologies), and trust is required to make these processes efficient (Raj, Wilk, & Platt, 2019; Wilk & Platt, 2016). Accordingly, the development and maintenance of trust is critical when collaborating across organizational boundaries within the health care system.

Trust and objects

Trust mostly encompasses behavioral (i.e., predictability in behavior), cognitive (i.e., reliability and meeting expectations), and emotional (e.g., eliciting positive or negative feelings) components, as well as a moral foundation (i.e., fairness) (Bachmann & Zaheer, 2006; Newell & Swan, 2000; Zaheer et al., 1998). Some divergent forms of trust are highly connected to individual traits and interpersonal relations and represent an emotional and affective dimension of trust (such as companion or relational trust); others, based on contractual regulations, are grounded in a transactional perspective and represent a rational and cognitive dimension of trust (such as calculative trust). On the other hand, competence trust is based on competence characteristics and the abilities of the trusted; it relies on both personal competence as well as institutional arrangements such as education systems, accreditations, certifications, professional codes of conduct, and other ways to prove legitimacy. Competence trust may not necessarily develop through interpersonal interactions but can be driven by contextual cues, such as an actor's certifications, educational background, profession, or institutional reputation (Bachmann & Inkpen, 2011; Newell & Swan, 2000; Paul & McDaniel, 2004). Competence trust is particularly important for collaboration within health care systems since these systems are often highly institutionalized; functionally specialized; and regulated through authorizations, certifications, and accreditations (Scott et al., 2000). Accordingly, studies of the role of trust among health care professionals demonstrate how competence trust is positively related to productivity, as it reduces double-checking of work and allows greater delegation of tasks (Raj et al., 2019; Soine et al., 2013; Wilk & Platt, 2016).

Trust towards digital objects and technology seems to focus on different components than interpersonal trust. For instance, Clarke et al. (2006) argue that a user's trust in technology relies on the perception of the dependability and accuracy of the technology and the ability to make sense of it. Accordingly, reliability and predictability are crucial in trusting technology, whereas emotional and affective components are absent. Furthermore, studies show that human actors

tend to perceive technology as more credible sources of information than humans. However, trust in technology is also more sensitive to errors, leading to a fast decline in the perception of technology's credibility and reliability; meanwhile. human errors are perceived as "natural" and therefore more easily tolerated and forgiven (Clarke et al. 2006, Madhaven & Wiegmann, 2007). Further, humans can restore trust through trust-repairing activities and by acknowledging and explaining errors, whereas trust repair is challenging with technology.

However, these components of trust relate to human agency and implicitly rely on human dispositions or traits (Bachmann, 2011), thus excluding objects and other materials in relation to their trust-building capacities. As a result, trust has – as with other organizational matters (cf. Orlikowski, 2007) – mostly been studied as a human phenomenon, with scarce attention towards objects and materiality. This is a critical shortcoming since several scholars have demonstrated how objects are important for enacting practices and relations (Nicolini et al., 2012; Orlikowski, 2007) and how they may serve as boundary objects, which mediate and facilitate collaborative practices across organizational and professional boundaries (Carlile, 2002; Star & Griesemer, 1989). As a concept, "boundary object" originates from the actor-network theory (ANT), in which materials and objects are perceived as important actors to understand actions, relations, and collaboration processes. Boundary objects mediate collaboration between actors from divergent knowledge domains and across organizations since they translate and transform to create an infrastructure for collaboration. Accordingly, they enable knowledge sharing and joint action across professional and organizational boundaries (Star & Griesemer, 1989). Thus, it can be assumed that objects also perform a crucial role in the (de)generation of trust in inter-organizational collaboration processes since such objects also may have a social function, where they mediate relations and may represent the collaborators. Based on this, one could argue that such objects become representatives of the collaborators' practices and competences, making them important for actors' trust in their collaborators in terms of reliability, predictability, and their competences to perform joint tasks.

Though the literature has mainly focused on the positive aspects of objects, they also have a flip side, as they can be used to protect interests and jurisdictions, disguise conflicts, enforce existing boundaries, and impede collaboration by creating unrealistic expectations, misunderstandings, and lack of trust among actors (Barrett & Oborn, 2010; Bechky, 2003; Carlile, 2004; Nicolini et al., 2012; Oswick & Robertson, 2009; Zuzul, 2019). In this vein, objects may disguise actors' signs of trust by blurring nonverbal communication and reducing interpersonal interactions (Fullwood, 2007; Paul & McDaniel, 2004; Raj et al., 2019). These possibilities illustrate the ambiguity of objects while also showing that they perform important roles in building and maintaining trust.

Although the relation between trust and objects has not been explicitly theorized in the existing research, it seems that trust between actors can be mediated through objects, which may influence their boundary spanning activities and inter-organizational collaboration processes.

Design and Methods
Context: The Danish health care system
Most Western health care systems, including Denmark's, are operated by multiple health care providers. In Denmark, the health care system is primarily publicly financed and is operated by three main providers: 1) *hospitals*, which are responsible for specialized treatment and emergency care and are owned and administered at a regional level; 2) *municipalities*, which finance and administer home care and nursing homes and are responsible for preventive measures, health promotion, and rehabilitation; and 3) *general practitioners (GPs)*, who are family doctors, acting as gatekeepers to hospital treatment and most municipal health services. Based on this division of labor, the Danish health care system can be characterized as a complex, multi-stakeholder environment, where collaboration is necessary to coordinate care for patients with chronic conditions such as COPD (Seemann & Gustafsson, 2016). As in many other areas in the public sector, the Danish health care system consistently focuses on optimizing the use of resources and delivering health services efficiently. Implementing digital health services such as tele-home monitoring services is perceived as a way to achieve these goals (Danish Government, Local Government Denmark & Danish Regions, 2022).

Case: The TeleCare North program

The aim of the TeleCare North program was to develop a tele-home monitoring solution for patients with COPD that involved the three main health actors: hospitals, municipalities, and GPs. The program was developed and operated by 4 hospitals, 11 municipalities, and 225 GPs, covering the northern part of Denmark and involving more than 1,200 COPD patients, cf. Figure 1.

Figure 1. Health care actors in the TeleCare North Program
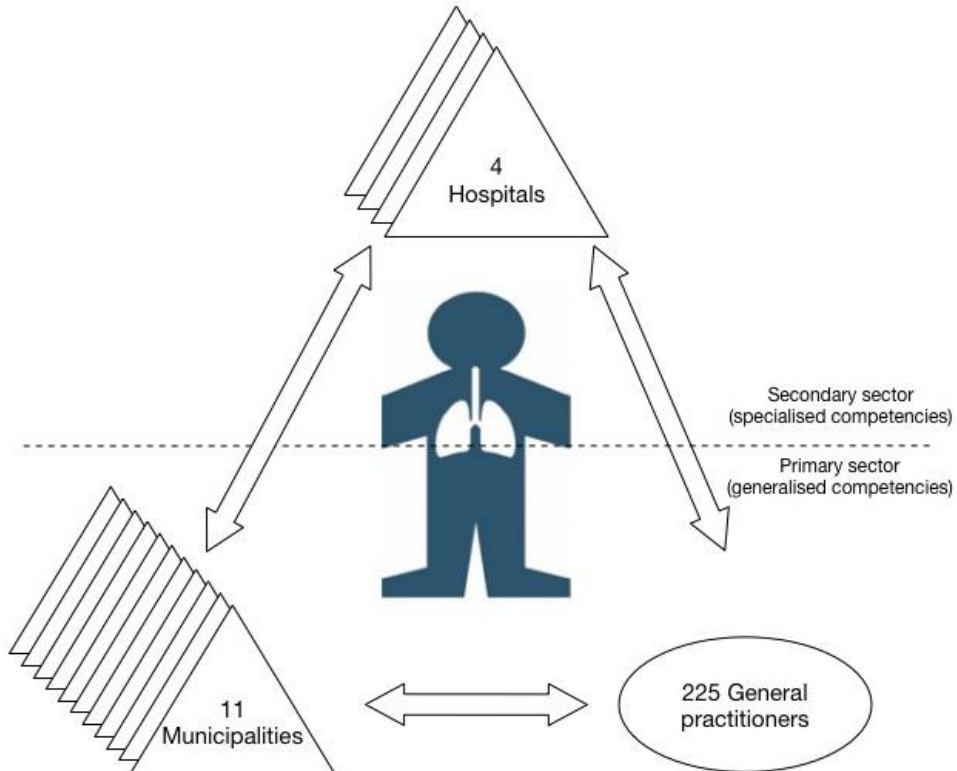
In their homes, the COPD patients self-measured their oxygen levels, blood pressure, pulse, and weight. These measurements were sent to an electronic monitoring database called OpenTele, which participating GPs and health professionals from municipalities and hospitals could access to monitor patient data. To support assessment of the measurements, different threshold values were identified and a visual alarm system was included, causing green, orange, red, and blue alarms to appear beside the measurements depending on whether they were inside or outside the threshold values. Besides being a shared database, OpenTele functioned as a digital platform for collaborative actions among health professionals from municipalities, hospitals, and GP clinics, and in the context of this paper, OpenTele is explored as a digital object used for collaboration between these various health professionals. OpenTele was developed by a smaller Danish IT company and the database was a stand-alone solution, i.e., not integrated in the existing IT systems used by the health care professionals (e.g., electronic patient record or electronic care record).

Design and data sources

This paper focuses on part of a longitudinal qualitative case study (Christensen, 2017), in which the TeleCare North program was followed over a period of three years, from its development in 2012, through its implementation in 2014, up to its attempted integration into daily routine operations in 2015. This paper covers 2014-2015 and represents an extreme case (cf. Thomas, 2011) of the relation between trust and digital objects in inter-organizational collaboration since

collaboration was primarily digitally mediated, with limited supplementary boundary spanning activities. This form of collaboration may amplify existing trust dynamics or the role of digital objects, because the interaction context is removed. This provides novel insights about the relation between trust and objects. Accordingly, this case contributes a more nuanced theoretical understanding of digitally mediated inter-organizational collaboration.

The unit of analysis is trust and how it is mediated among the different health care professionals by the OpenTele monitoring database rather than the tele-home monitoring service itself or the healthcare professionals -- see figure 2. Unlike a focus on structures or actors, the focus on the actions surrounding and mediated by objects enables an understanding of the work that the objects perform (Nicolini et al., 2012), which allows an exploration of the relation between trust and objects.

Figure 2. Actors and relations of trust
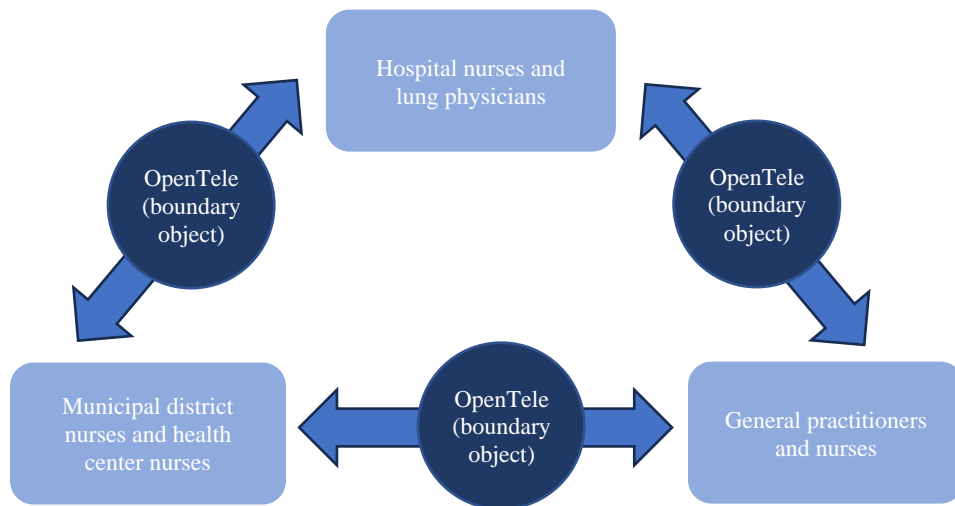
An organizational ethnographic inspired approach was used to generate data (Ybema et al., 2009). Health professionals from two municipal health centers, two district nurse units, two hospital lung wards, and six GP clinics were interviewed about their usage of OpenTele and changes in their practices and collaborative relations. They were re-interviewed after 12 months. In total, 28 in-depth interviews with health professionals and 10+ hours of observation were completed. The observations focused primarily on nurses' interaction with OpenTele while performing tele-home monitoring tasks. They contributed to a nuanced understanding of OpenTele and the context in which the system was used. Particularly, the observations offered insights into the more problematic features of OpenTele and how these affected inter-organizational collaboration processes in terms of trust building.

The participants were recruited through local project managers for TeleCare North, except for the GPs, who were recruited through direct contact. Moreover, different meetings in cross-sectorial groups for implementation and experience-exchange were observed. Overall, the interviews and observations gave insight into the divergent actors' practices, their collaborative relations, and their interactions with and perceptions of OpenTele. Each interview was transcribed, and field notes were written to record observations. Additionally, various documents related to the TeleCare North program were collected, e.g., business cases, meeting minutes, work instructions, and progress reports, which formed a rich contextual knowledge of the program.

Table 1. Data sources

Organization	Actors	Interview	Re-interview (12 months)	Observation
Municipality 1				
Health center	Nurse B	X	X	
	Physiotherapist			X
District nurse unit	Nurse A	X*		X
	Nurse C		X*	
Municipality 2				
District nurse unit	Nurse	X	X	
Municipality 3				
Health center	Nurse D and E (Double interview)	X	X**	X
Hospital X	Lung physician	X	X	
	Nurse	X	X	X
Hospital Y	Lung physician	X	X	
	Nurse	X	X	X
GP clinics	GP 1	X***		
	Nurse, GP 1 clinic		X***	
	GP 2	X	X	
	GP 3	X	X	
	GP 4	X	X	
	GP 5	X	X	
	GP 6	X	X	
Cross-sectorial implementation group	Local project managers from 11 municipalities and 4 hospitals			X
Experience-exchange meetings	Health professionals from municipalities, GP clinics, and hospitals			X
Documents	Minutes from various meetings, presentations at conferences, newsletters, status reports, applications for external funding, business cases, work manuals for tele-home monitoring tasks			

*Re-interview with Nurse C since Nurse A changed tasks
**Re-interview with Nurse D since Nurse E changed jobs
***In GP Clinic 1, the nurse primarily handled contact in relation to TeleCare North at the 12-month re-interview round.

Data analysis

The software program NVivo 10 was used to help structure the data. The analysis was performed by the author and concerned the trust-building capacities of OpenTele in terms of focusing communication and creating shared knowledge, improving predictability and transparency in behavior and decision making, and improving visibility of work contexts and tasks. Concretely, the analysis investigated statements and observations about the actors' trust perceptions and behavior towards their collaborators in relation to OpenTele and how OpenTele mediated collaboration among health care professionals. Statements about how OpenTele mediated shared understandings and treatment, professionalized collaboration, represented collaborators' practices, and visualized their mutual obligations and their fulfillment were used to illustrate how OpenTele supported trust building among the actors.

Findings

Trust-building capacities: Focusing communication and creating shared knowledge

OpenTele enabled shared access to the participating patients' measurements and facilitated shared language about and knowledge of the patients. Communication between municipal nurses, hospital nurses, lung physicians, and GPs was anchored in the data in OpenTele, supporting more focused communication. For instance, one of the municipal nurses explained how she used OpenTele to focus her communication with the GP:

> I know what the GP wants. It is of no help if I call the GP and tell him that the patient is feeling a bit worse. I need to have some specific observations, like changes in their vital signs. So [with OpenTele], I can deliver relevant observations that the GP acknowledges. (Nurse D, Municipality 3, Interview 1)

Accordingly, OpenTele focused communication between the actors and enabled a mutual focus on vital signs, which functioned as a shared language and a means of representing their knowledge in a professional manner. One of the GPs explained how this new way of representing knowledge enabled her to act upon the municipal nurse's observations:

> The [OpenTele] creates some relevant observations that the municipal nurses share with me. For instance, how the patient's oxygen level or blood pressure is lower when she is at home compared with the measurements we make at the clinic. Yeah, relevant observations where I can take actions. So, the municipal nurses share relevant observations which I can use in my work with the patient. (GP 5, Interview 1)

This professionalized and focused representation of knowledge created higher awareness of the actors' competencies among their collaborators, which continued to develop over time. Overall, OpenTele created an infrastructure for communication, which supported the establishment of competence trust among health care professionals from different organizations.

Trust-building capacities: Improving predictability and transparency in behavior and decision-making

The shared access to patients' measurements and the use of joint guidelines for tasks related COPD treatment enhanced predictability and transparency in behavior and decision making. For instance, one of the GPs explained how tele-home monitoring created a more systematic approach to COPD treatment, which was shared among collaborators:

> The best thing [about tele-home monitoring and our collaboration with the municipalities] is the systematic approach to our COPD patients, and how we refer them to rehabilitation programs [in the municipalities] and assess their need for self-treatment plans. (GP 6, Interview 2)

This systematic approach created transparency in collaborators' actions, which supported trust building. Furthermore, having shared threshold values for patients' vital signs guided the different health professionals' actions in a certain direction. For instance, a red or yellow alarm indicated that a patient's measurement was outside the threshold values, which was defined by lung physicians and other medical experts. Accordingly, a red or yellow alarm required attention and specific actions, e.g., telephone contact with the patient and GP. This increased the predictability of the collaborators' behavior and decision-making processes in relation to tele-home monitoring tasks. For example, one nurse from a lung ward explains how the ward nurses' confidence in the municipality nurses has increased since they joined the program:

> Our perception compared to earlier is that they are more qualified in the municipalities. I'm not sure whether it is because of our shared [monitoring database] and that we observe that they handle the monitoring tasks well—and this gives us confidence about their competencies (…), but our awareness of the municipalities' competencies is higher now (…). I don't know whether we were insecure about their competencies before, but our anticipation was that we were the experts, and they were not. And, of course, we are still the experts, but in relation to the COPD patients, I think that we are quite equal now. (Nurse, Hospital Y, Interview 2)

Overall, OpenTele improved predictability and transparency in behavior and decision-making processes for health professionals from divergent organizations as they collaborated. This supported trust building among the actors.

Trust-building capacities: Visibility of work contexts and tasks

Participation in the tele-home monitoring program emphasized the different roles, tasks, and work contexts for each of the health professionals. This increased awareness of mutual dependencies, differences in work contexts, and limitations. For instance, one of the GPs received repeated (redundant) inquiries from one of the municipal nurses. Therefore, the GP contacted the municipal nurse:

> It was nice to talk on the phone [with the municipal nurse]. Suddenly I realized that she must follow some guidelines. Well, that's just how it is for nurses. And then we talked about how we wanted to collaborate in the future. (GP 4, Interview 1)

This conversation improved the GP's awareness of the municipal nurses' conditions for performing their tasks in relation to COPD patients and the tele-home monitoring program. Accordingly, OpenTele increased the visibility of the different actors' work contexts, limitations, and obligations in relation to tasks related to the tele-home monitoring program. This enhanced a mutual understanding of each other's behavior and hence supported the development of trust among the collaborating actors.

In another example, one of the lung physicians shows his awareness of the different work practices and approaches between the hospitals and the GPs:

> The GPs have a lot of different functions and tasks. And their way of working is quite different from ours, which makes it challenging to collaborate. For instance, in TeleCare North the patients are measuring their blood pressure as one of the routine measurements. As a result, we've detected several patients with high blood pressure. However, this is not aligned with the methods that GPs use. They usually ask their patients to measure the blood pressure at a certain frequency for a limited period – and not once every week as in the TeleCare North Program. So, we must learn from these differences and find a joint approach. (Lung physician, Hospital X, Interview 1)

The tele-home monitoring program enabled a mutual understanding of differences in work practices and approaches, which helped the actors establish a joint approach to the patients and their vital sign measurements that was easier to translate into each actors' work practice.

Utilizing trust-building capacities: Joint problem solving

The OpenTele monitoring database functioned in many aspects as a boundary object that mediated and facilitated inter-organizational collaboration. This differed from the existing mono-sectorial IT systems that the health professionals normally used (e.g., electronic health records at the hospitals). Several health professionals explained how OpenTele established a joint focus on the same aspects of the patient's condition and legitimated collaboration:

> It becomes a shared patient. Maybe it was also like that before, but now OpenTele becomes the link between municipalities and hospitals (…) We have a shared "headline" now that is called OpenTele, which creates legitimacy to collaborate and a joint focus. (Nurse, hospital Y, interview 1)

Although the health professionals were used to collaborating in relation to COPD patients (and in other areas), OpenTele enhanced mutual understanding and joint problem solving. This was supported by its trust-building capacities, e.g., the focused communication and shared knowledge, which enabled health professionals to use each other's knowledge about a patient's condition in their own decision-making processes. For instance, one nurse at a GP clinic explains how the clinic used a municipal nurse's observations and knowledge in their decision-making process in relation to a referral to the hospital:

> Well, we [at the GP clinic] can use some of these measurements the patients make at their homes. The other day, we made a referral to the lung ward at the hospital – that is also part of this TeleCare North Program – and in this referral we used some of the things that [name of the municipal nurse] gave us about the patient's condition. We made the referral because she observed a worsening in the patient's condition. (Nurse, GP Clinic 1, Interview 2)

Using the collaborator's knowledge as basis for decisions and actions requires faith in the collaborator and his/her trustworthiness. OpenTele supported trust building between the collaborators, which improved their collaboration and ability to engage in joint problem solving.

The flip side: Distrust and suspicion

Although OpenTele had trust-building capacities, it also had a flip side, where it created distrust and suspicion. This was particularly obvious in the context of predicting behavior and creating transparency about decision-making processes. The monitoring database only displayed the decontextualized "snapshot" of the patients' vital signs but not the actions (or re-contextualization) related to the observations. Actors' reactions to alarms in the monitoring system were invisible to their collaborators. This decreased the transparency and the predictability of actors' reactions, decision-making processes, and behavior and in several instances created distrust among the health professionals. In the following quotations, a municipal nurse and a hospital nurse, respectively, demonstrate this mutual distrust about their counterparts' ability to react to measurements outside the threshold values:

> We have a patient who is currently being monitored by the hospital. I am curious, so I still check his data. I discovered that the hospital doesn't really react to bad vital signs from him (…). But I get indignant about the hospital staff not completing their tasks (…). So, I have this distrust: "Are they [the hospital nurses] checking the patients' data, and are they reacting to it? So, I feel like I must check up on it myself. (Nurse B, Municipality 1, Interview 1)

> Well, I don't check the patients who are monitored by the municipalities. However, when I see the list of patients [in the monitoring database before selecting my own patients], I think it's strange that there are so many patients with red alarms [indicating measurements outside the threshold values]. (Nurse, Hospital Y, Observation notes)

In these examples, it was impossible for the nurses to know what was done by their collaborators to handle the symptoms causing the alarms since these actions were documented within their mono-organizational health care records, which were unavailable to their collaborators. One of the nurses reflected on this:

> After checking the patients' measurements, the nurse shows how she documents her actions and initiation of treatment in the electronic patient record (EPR). The nurse finds it a bit foolish that they document in their own hospital systems [EPR] since the municipalities cannot access them. She reflects upon the fact that they use a cross-sectorial monitoring system for documenting the patients' measurements, but they still use their own documentation and patient record systems. (Nurse, Hospital Y, Observation notes)

Consequently, the core design of the shared monitoring database increased the risk of generating distrust among the health professionals and, hence, constraining collaboration.

Moreover, distrust was spurred in situations in which health professionals did not meet their collaborators' expectations in relation to the TeleCare North program. For instance, one municipal nurse explains her disappointment in one of the GPs:

> The GP in this area have received information material about TeleCare North program several times, so they ought to know about this program and their obligations. But many of them tell us that they never heard of it and refuse to participate in the program. And in the beginning, there were so many problems with the referrals of the patients. We almost had to do the work for them. Yeah, we had to show them where to find the instructions and guide them in filling the admission forms. (Nurse C, Municipality 1, Interview 2)

OpenTele made their collaborators' work visible and transparent, which led to frustration and disappointment about their collaborators' lack of engagement and competencies to fulfill their tasks in relation to the program.

In situations where distrust was generated, the health professionals withdrew from collaborating and were reluctant to distribute tasks to their collaborators. However, several health professionals mentioned how they resolved conflicts by calling their collaborators or inviting them to meetings. For instance, one lung physician explained how she invited GPs to informal network meetings to discuss new treatment guidelines and projects like TeleCare North to improve their relations and collaboration:

> We have these informal after-hours meetings [with the GPs] where we talk about different things like new inhalation medication, COPD, and our equipment (…) We get to know each other in a more personal way – and it is always easier to call someone you know and make a referral to us since they know us and the equipment we use. (Lung physician, Hospital Y, Interview 2)

This suggests that boundary objects must be supported by boundary spanning activities, particularly when resolving conflicts and building relations.

Limitations and Generalization

This study relied on a qualitative case study design. A common limitation in qualitative studies relates to generalization to broader populations. However, other considerations and methods can be used to generalize findings to other contexts or broader populations. The qualitative case study enables analytical generalization through the connection between the case and the theoretical framework (Thomas, 2011). Moreover, results can be generalized to similar contexts through the concept of transferability. Transferability of results is enabled through thick descriptions of the case and the specific context in which it unfolds (Guba & Lincoln, 1985).

In this study, the case consisted of an inter-organizational tele-home monitoring network, through which the relation between digital objects and trust was investigated. The theoretical framework consisted of a synthesis of research on trust dynamics and boundary objects as mediators in inter-organizational collaboration processes. Although the study focuses on a local Danish tele-home monitoring program, the case exemplifies the digitalization of welfare services like health care and how it changes inter-organizational collaboration processes in terms of trust building and maintenance. Hence, the results of this study can be analytically generalized to other empirical contexts where inter-organizational collaboration is primarily mediated through a digital interface with limited possibilities of direct interaction. However, the context may be limited to highly professionalized contexts, such as health care systems with professionally trained personnel. More studies are required to further explore the generalization of these results and enhance our knowledge about the role of digital objects in trust building and resilience in inter-organizational networks.

Discussion and Concluding Remarks

Since inter-organizational collaboration is essential within health care and other public organizations, it is important to use tools that support effective collaboration processes. In that vein, boundary objects can be used to mediate collaboration by creating an infrastructure for communication and allowing the exchange of knowledge (Carlile, 2002; Nicolini et al., 2012; Star & Griesemer, 1989). This may be particularly useful in contexts where collaboration relations are dynamic and fast-changing, and trust is less resilient among collaborators. In such contexts, boundary objects can be functionally equivalent to trust in terms of enabling efficient collaboration processes, to some extent. Moreover, boundary objects also have trust-building capacities since they mediate trust and distrust in various ways. As demonstrated in this study, boundary objects build trust by creating a focused, professional representation and shared knowledge about patients and their trajectories across municipalities, GPs, and lung wards. Particularly, this professional representation of knowledge supports the development of competence trust, which is important in health care in relation to delegation of tasks and distribution of responsibilities (Raj et al., 2019; Soine et al., 2013; Wilk & Platt, 2016). Second, boundary objects support trust building among collaborators by creating predictability and transparency in behavior and decisions. Third, boundary objects create visibility of work contexts and tasks, thereby enhancing mutual understanding. Overall, these capacities support the building and maintenance of trust among the various health professionals. The study also shows how trust was reflected in joint problem-solving activities and mutual learning.

However, the study also shows a flip side of boundary objects and their trust- building capacities since they also have the potential to create mistrust and suspicion about motives and behavior. This may challenge moral foundations and beliefs about whether collaborators behave according to the professional standards, values, and norms in health care. Mistrust is spurred both by illuminating actors who do not fulfill obligations and tasks and by the core design of the IT system, which only contains patients' measurements with no information about the health professionals' actions or decision-making processes. In that vein, OpenTele decontextualizes information and knowledge which may hinder trust and make actions and decisions less transparent and accessible for the collaborators. This makes using boundary objects a risky

business. However, boundary spanning activities mitigate the risk and further support the building and maintenance of trust among boundary spanners. Other studies support the notion that boundary objects must be supplemented by boundary spanning activities (Levina & Vaast, 2005).

This study shows that boundary objects have practical implications for trust building in inter-organizational collaboration processes. Boundary objects privilege certain forms of knowledge-sharing and work practices, whereas others fall into the background and become invisible. For instance, the red alarms in the monitoring system were very visible to all collaborators, whereas the work related to handling of these alarms was invisible to those outside an organization. Accordingly, digitalization of health care services reconfigures work practices and inter-organizational collaboration processes (Nicolini, 2006), making it important to consider practical implications and organizational matters when implementing digital health care services.

These insights about boundary objects' trust-building capacities may be utilized more strategically to facilitate and support inter-organizational collaboration by designing and creating boundary objects (e.g., digital tools) that also focus on building trust among their users.

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